

ONTARIO MINISTRY OF THE ENVIRONMENT

TOWN OF SMITHS FALLS

GASOLINE CONTAMINATION OF
PRIVATE WELL SUPPLIES

F. R. Campbell

1972

MOE
SMI
GAS
APJF

c.1
a aa

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca

MINISTRY OF THE ENVIRONMENT

REPORT ON FIELD INVESTIGATIONS

DATE OF EXAMINATION - November, 1971.

PLACE - Smiths Falls

MATTER INVESTIGATED - GASOLINE CONTAMINATION OF PRIVATE WELL
SUPPLIES

AT REQUEST OF - T. Dafoe, Industrial Wastes Branch

INSPECTION MADE IN COMPANY WITH -

OTHER PARTIES SEEN - Affected Residents

REPORTS TO BE SENT TO -

A. K. Watt

D. P. Caplice (4)

J. R. Barr

L. G. South

A. I. MacIver

Surveys and Projects (3)

Central Records

OTHER RECOMMENDATIONS TO THE OFFICE RE PROCEDURE TO FOLLOW -

Three extra copies of this report are provided
to the Industrial Wastes Branch for distribution to the
complaintant, the municipality and the regional office.

REPORT BY



F. R. Campbell, Hydrogeologist.

NOTE: This completed form to be attached to each report.

MINISTRY OF THE ENVIRONMENT

TOWN OF SMITHS FALLS GASOLINE CONTAMINATION OF PRIVATE WELL SUPPLIES

INTRODUCTION

In response to a request from Mr. T. Dafoe, Industrial Wastes Branch, an investigation was conducted by the Water Quantity Branch to determine the cause of gasoline contamination of a number of private well supplies south-west of the Town of Smiths Falls.

Background

Petroleum product tastes and odours have been a problem in private well supplies in the study area for a number of years. In September, 1962, the Division of Water Resources, OWRC, reported on phenol contamination of ground water in the area. It was noted at that time "that phenols in the water in this area were not a new problem but one which had occurred before". The report concluded that (1) because of thin overburden conditions on a fractured bedrock aquifer, surface drainage is able to enter the aquifer easily, (2) the phenols have resulted from dumpage, leakage and spillage of petroleum products in the area, but because of the number of possible sources of contamination in the area (six gasoline stations, a gasoline bulk storage plant, a trucking firm which services its own equipment on the premises and a

construction company which services its own equipment and stores its own gasoline), it was difficult to determine which of these outlets was the source of the contamination.

A number of complaints of petroleum product tastes and odours in local well waters were received by the OWRC since the 1962 investigation. In December, 1969, the Division of Sanitary Engineering, OWRC, investigated a complaint by Mrs. E. Bolton of taste and odour problems in her well water supply. Laboratory analyses of waters from Mrs. Bolton's and Mr. Taylor's wells did not detect any gasoline. Further complaints by residents, in the area have resulted in this investigation which was initiated in November, 1971.

GEOLOGY

The soils of the study area have been classified as Farmington loam, a medium textured, fairly well-drained loam soil formed on glacial till with bedrock at a depth of one foot or less. Well records for the area, which are presented in Table 1, indicate that, locally, the loam can vary from a predominantly clay loam to a sandy loam with occasional deposits of blue clay. Topographically the area is flat. The overburden varies in thickness from 0 to 8 feet with variations due mainly to depressions in the bedrock.

The bedrock in the area includes grey limestone of the Oxford formation and interbedded grey calcareous sandstone and blue-grey dolomite of the March formation.

Locally, the bedrock surface slopes in a westwardly direction. The regional structural dip is about 5 feet per mile in a north-east direction. The rock is fractured and water bearing.

HYDROGEOLOGY

Surface drainage in the area is limited and poorly developed because the land surface is virtually flat. Infiltration of surface runoff through the shallow soil to the underlying fractured bedrock should occur fairly rapidly, except in areas which contain deposits of clay.

The direction of ground-water flow is difficult to determine precisely as static water level measurements could not be obtained at the time of the field investigation because all of the wells in the area are permanently sealed. Regionally, it is expected that ground water would flow by gravity in a north-easterly direction toward discharge in the Rideau River. This assumption is strengthened by the reports of local residents that wells to the north-east of a former sand-salt pile located west of Falls Lumber Company became contaminated with salt. Locally, the direction of ground-water flow in the bedrock is controlled by the orientation of fracture systems in the rock and the pumping of local wells. The cone of influence of a pumped well can draw a contaminant toward the well against the prevailing direction of ground-water flow.

WATER QUALITY

Samples of well waters in the area were collected on November 10, 1971 and analyzed for gasoline and other chemical components. The locations of the sampled wells are shown in Figure 1 and the analyses results are presented in Table 2.

One well adjacent to McCracken Motors, contained water with 25 ppm of gasoline. Another nearby well, at Reynolds Spur Station, contained possible gasoline residues. The Falls Lumber Company well located between these two service stations yields water with gasoline tastes and odours that were quite apparent in the field, however, no gasoline was detected at the laboratory in the water from this well. No other well waters in the area appeared to contain gasoline at the time of the study. This may in part be due to the deepening of many of the wells in the area which were at one time contaminated with a petroleum product. Deepened wells, in which the upper gasoline contaminated zones were cased off, now yield gasoline free waters but taste and odour producing hydrogen sulphide gas, H_2S , is present in the supplies.

In general, the ground water in the area contains high concentrations of H_2S , iron and dissolved solids. These components can produce objectionable tastes and odours in the well water.

Con't. .../5

PRESSURE TESTING OF GASOLINE STORAGE FACILITIES

Upon completion of this branch's field investigation, Mr. A. I. MacIver, Ministry of Consumer and Commercial Affairs, was requested to initiate appropriate tests of gasoline storage systems in the study area. The following results were reported by R. S. McLaren, Ministry of Consumer and Commercial Affairs.

Murrays Marine:

This outlet was pressure tested last summer because of a suspected source of contamination of the Crescent Court Motel water supply. The pressure test at that time indicated no leaks and dip records up to this date confirm no leaks at this outlet.

Fina Bulk Plant:

Pressure test conducted February 14 and 15. No leaks were indicated by pressure test on the tanks. One defective valve was repaired on the line, a leak at the spout on the loading rack was repaired. Dip records were not kept.

Fina Service Station:

Dip records accurately kept, indicating no leaks.

Reynolds Spur Station:

Pump union on the suction line was leaking last summer and repaired. Subsequent dip records indicate no leaks.

Wills Transfer:

This Gulf Oil Company consumer outlet was not keeping proper records. A pressure test was ordered and performed on January 17 and 18. Tank test was O.K. but the suction line had a small leak at the union.

Sunoco Service Station:

Dip records accurately kept which indicated no leaks.

McCracken Shell:

Pressure test conducted on January 4 and 5 as ordered in a letter to Mr. G. Libby, Shell Oil, December 29, 1971, by A. MacIver. Tank test was O.K. but there were two small leaks on the suction line.

Larmour Esso:

Dip records accurately kept which indicated no leaks at this location.

Johnston Shell:

Pressure test ordered because of no dip records. Test indicated no leaks and was performed on January 11 and 12.

Ustel B.P. Station:

Dip records accurately kept and indicate no leaks.

DISCUSSION AND CONCLUSIONS

Petroleum product tastes and odours have caused water quality problems in a south-west section of Smiths Falls for a number of years. The thin overburden in the

area provides little protection to the underlying fractured bedrock aquifer. Gasoline spilt on the ground or leaking from a storage tank will easily percolate through the well drained, thin soils and enter the aquifer. The contaminant once in the aquifer will move in a downgradient direction away from the source or could be drawn toward pumping wells against the prevailing direction of ground-water movement.

As a result of the investigation by representatives of the Ministry of Consumer and Commercial Affairs a number of small leaks of gasoline were found.

Mr. McLaren also reported an unconfirmed serious leak at Johnston Shell a number of years ago, where as much as 1000 gallons of gasoline were lost. Also, Wills Transfer had only recently installed a new tank and reports indicate that the old tank was full of holes.

It may be concluded therefore, that the long standing water quality problem in the study area is a result of a host of old and recent petroleum losses from either spills or small leaks. These losses have resulted in the contamination of the private well water supplies. Many or all of these sources have likely contributed to ground-water pollution in the area.

ALTERNATE WATER SUPPLIES

There are several methods which could be attempted to restore water to those affected by the presence of gasoline in their water supply. These alternatives include:

- (1) Water could be hauled to the affected residences. This would necessitate the provision of storage facilities at each site. The existing wells are not suitable for this purpose.
- (2) Treatment of the gasoline contaminated waters could be attempted by the affected parties through the use of an activated carbon-diatomaceous earth filter to remove gasoline tastes and odours from the water.
- (3) The affected residents could attempt to drill to a deeper uncontaminated aquifer to locate a new source of water supply. This could be done on a communal or individual basis. Care should be taken to seal off any gasoline contaminated zones while drilling so that the contaminant cannot enter the lower aquifer through the well bore. There is no guarantee that such a supply will not become contaminated in the future. The H₂S water found at depth could be treated to remove this objectionable taste and odour causing gas.
- (4) The affected residents could consider applying to the appropriate authorities for a connection to the Smiths Falls distribution system.

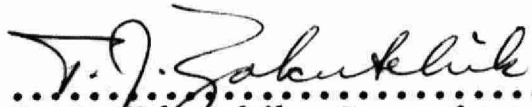
RECOMMENDATIONS

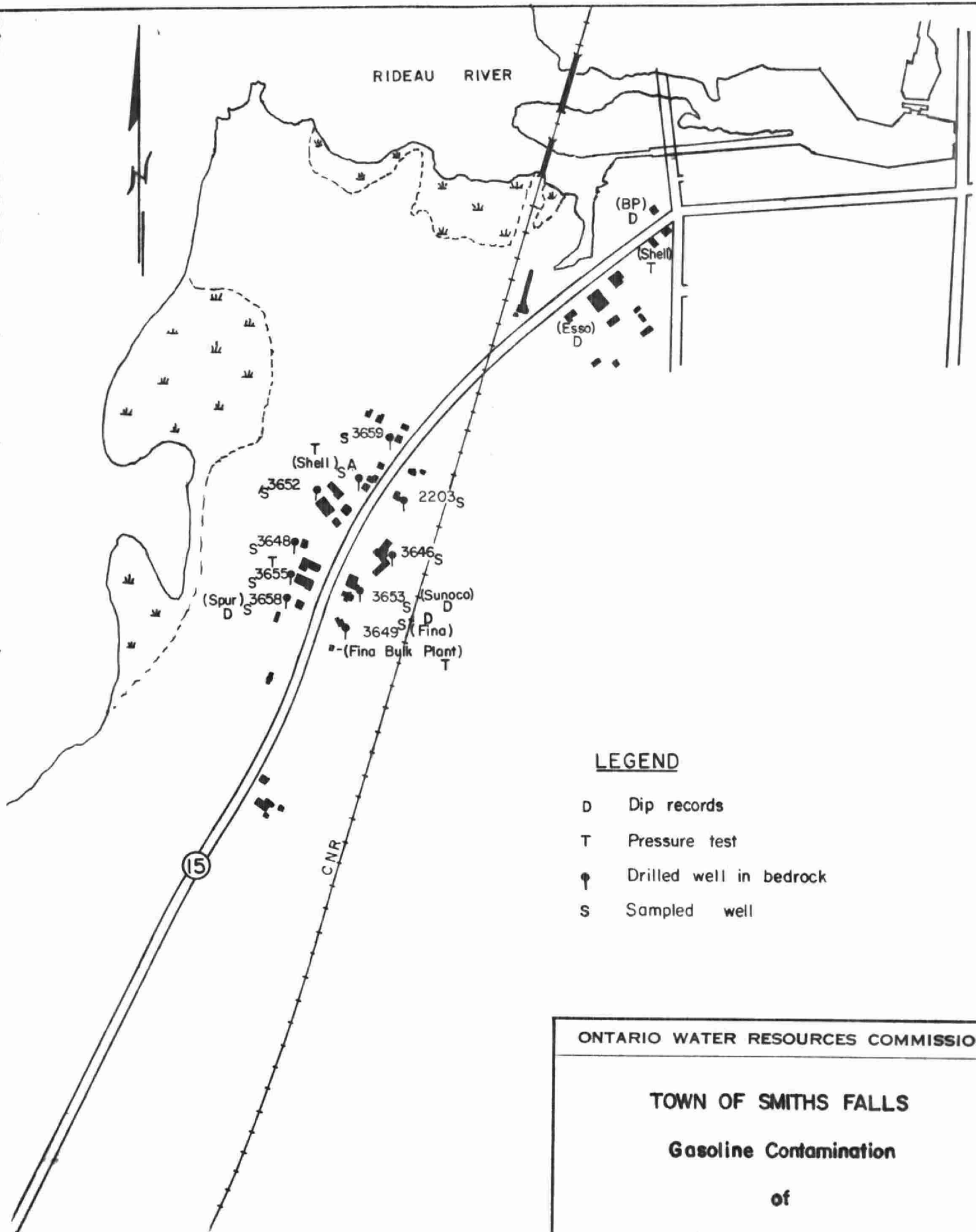
It is recommended that representatives of the Ministry of Consumer and Commercial Affairs insure that the necessary steps are taken in the area to improve

handling techniques and facilities to prevent further
aquifer contamination by gasoline.

Prepared by: F. R. Campbell, Hydrogeologist,
Surveys and Projects Section,
Water Quantity Branch.

FRC/tc
18/05/72.


.....
T. J. Yakutchik, Supervisor,
Surveys and Projects Section,
Water Quantity Branch.



ONTARIO WATER RESOURCES COMMISSION

 AREA OF SURVEY SMITHS FALLS

 COUNTY LANARK LEEDS GRENVILLE

TABLE OF WATER WELL RECORDS

 DATE FEB 72

 RECORDER S. Sisson

TABLE I

Well No.	Location		Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
	CON LOT												
3659	S. ELMSLEY TWP	IV 3	E.H. BOLTON	C.V. MORRISON 80	☐	6	48	5	10	5	FR	D	0 cl 2 to 48 47
A.		IV 3	MCCRACKEN MOTORS SHELL GAS W TAYLOR - WHITE RO		☐	6	53	9			FR	C	0 - 2 1/2 to 53
3652		IV 3	FALLS LUMBER CO	C.V. MORRISON 61	☐	5	60	8	10	8	FR	D C	0 earth 1 to 42 sdet to 60 * 52-60
3648		IV 3	SPORT SHOP L. NICHOLS	WV NUGENT 54	☐	6 1/4	70	15	30	25	FR	D	0 sdy beam 8 sdet 70 * 61
3655		IV 3	TRUCKING W. WILLIS	C.V. MORRISON 57	☐	4	50	3	6	4	FR	D C	0 to 2 sdy to 50 * 35-50
3658		IV 3	SPLUR A. EDWARDS	CV MORRISON 50	☐	6	45	4	10	4	FR	P C D	0 shale 4 to 45 * 44
3649		IV 3	FINA GAS	KLF. DAU 56	☐	6 1/4	70	20	5	30	FR	P C	0 cl 5 to 70 + 65
3653		IV 3	SUNOCO GAS KILBOURNE-McINTYRE	CA. MCCARTHY 55	☐	6 1/4	42 1/2	5	5	42	FR	P C	0 sdy beam 2 1/2 to 42 1/2 * 38
3646		IV 3	MAPLE LEAF MOTEL J. McEWEEN	J. MURPHY	☐	6	57	12	2	50	FR	P D	0 dirt & shale 10 to 57 * 48
3662		IV 3	CRESCENT COURT MOTEL O DUNCAN	J. MURPHY	☐	6	48	12	50	20	FR	D C	0 to 1 slate 21 to 48 * 35
3571		IV 3	HOWARD CLARK	THOMPSON BROS	☐	6 1/4	44	16	8	44	FR	D	0 cl beam 1 to 8 sdet 44 * 28-38
2203		IV 3	QUEANIEL A&W ROBT PRANT	WV. NUGENT	☐	4	87	22	3	75	FR	D P C	0 previously drilled 6" to 70' * 87 GASOLINE IN WELL - 75' of 4" cog installed, GASOLINE CUT OFF 70 SANDSTONE 87

AREA OF SURVEY SMITHS FALLS

COUNTY LANARK LEEDS GRENVILLE

DATE FEB 72

RECORDER S. Sisson

TABLE I

[illegible]

ONTARIO WATER RESOURCES COMMISSION

TABLE OF WATER ANALYSES

 AREA OF SURVEY SMITHS FALLS

TABLE 2

 DATE FEB 72 S. S. S. S. S.

Source and Number	Location and Owner	Date Sampled	Temperature in °F	pH	Mineral Constituents in										Alkalinity		Hardness		Total Dissolved Solids in ppm	GASOLINE ppm	Remarks
					parts per million (ppm)										as ppm CaCO ₃	Total	as ppm CaCO ₃				
					equivalents per million (epm)																
Calcium (Ca)	Magnesium (Mg)	TOC	SULPHIDE H ₂ S	Carbonate (CO ₃)	Bicarbonate (HCO ₃)	Sulphate (SO ₄)	Chloride (Cl)	Iron (Fe)	FREE AMMONIA	Nitrate (NO ₃)											
5 ELMLEY TWP																					
3646	HARLE LEAF MERE	NOV 10		7.4			5.5	0		233	34	7	0.60	.03	<.01	233	252		300	*	
3653	KILBOURNE-TRINITY SUNDGO STN	NOV 10		7.4			3.5	0		227	27	4	1.8	.03	<.01	227	242		260	*	
3649	FINA STN	NOV 10		7.3			7.0	0		293	45	37	2.3	.18	<.01	293	310		370	*	
3662	CRESCENT HOTEL	NOV 10		7.2			7.5	0		349	43	112	0.10	.36	1.0	349	436		590	*	
B	MURRAY'S MERE	NOV 10		7.2			4	0		314	26	294	0.05	.03	1.8	314	548		1000	*	
3571	H. CLACK	NOV 10		6.9			3	0		496	57	42	0.05	<.01	15	496	552		780	*	
3659	E. BOLTON	NOV 10		7.2			4	0		283	33	145	0.05	.01	3.4	283	320		610	*	
3652	FALLS LUMBER	NOV 10		7.4			12	0		378	26	228	0.15	.08	.30	378	412		820	*	
A	W TAYLOR 14° CRACKEN MERE	NOV 10		7.1			21	0		424	45	208	0.25	.02	.08	424	460		790	25	
3658	SPUR STN	NOV 10		7.1			18	0		366	45	91	0.55	.37	.23	366	424		580	**	
2203	QUEENEL A&W	NOV 10		7.6			55	0		240	30	20	0.85	.13	<.01	240	264		350	* * * COMPONENTS SIMILAR BUT DO NOT RESEMBLE GASOLINE COMPOSITION	
3657	RODGERS MERE	NOV 10		6.9			10	0		323	26	157	0.05	<.01	12.	323	198		720	* SENSITIVITY LIMIT 0.02 ppm	



(15974)

MOE/SMI/GAS/APJF

MOE/SMI/GAS/APJF

MOE/SMI/GAS/APJF

MOE/SMI/GAS/APJF

MOE/SMI/GAS/APJF

MOE/SMI/GAS/APJF

MOE/SMI/GAS/APJF

MOE/SMI/GAS/APJF